Résumé de thèse

Fiabilité des clades et congruence taxinomique - Application à la phylogénie des téléostéens acanthomorphes, par Blaise LI (1).

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En phylogénie, l'analyse combinée d'un ensemble de données peut faire apparaître des clades robustes mais pas fiables. Afin d'estimer la fiabilité des clades, la présente thèse propose un indice de répétition prenant en compte le nombre d'occurrences obtenues pour un clade sur un ensemble d'analyses de données indépendantes. Il est également tenu compte de la présence ou non de clades eux-mêmes répétés et incompatibles avec le clade d'intérêt. L'indice de répétition est appliqué à un ensemble de données d'environ 200 taxons et comportant quatre marqueurs nucléaires, dont un nouvellement utilisé : RNF213. Ces marqueurs sont analysés séparément et en combinaisons partielles, ce qui permet de bénéficier des avantages de l'analyse combinée tout en ayant des séries de résultats indépendants à comparer. Des arbres de synthèse incluant en priorité les clades les plus fiables sont construits, ce qui permet de préciser les relations entre acanthomorphes (Actinopterygii : Teleostei). Les groupements traditionnellement reconnus que sont les Labroidei, Scombroidei, Trachinoidei, Scorpaeniformes et Gasterosteiformes ne sont clairement pas monophylétiques. Cichlidae et Pomacentridae sont proches des Mugilidae, Gobiesocoidei, Blennioidei et Atherinomorpha. Les Gobioidei sont probablement groupe-frère des Apogonidae. Scombridae et Trichiuridae se placent dans un clade contenant Stromateoidei, Bramidae, Chiasmodontidae, Syngnathoidei, Dactylopteroidei, Callionymoidei et Mullidae. Xiphiidae et Sphyraenidae sont apparentés, entre autres, aux Carangoidei, Pleuronectiformes, Centropomidae et Toxotidae. Les Gasterosteoidei sont proches des Zoarcoidei, de la plupart des Scorpaeniformes, des Percidae, des Serranidae, des Trachinidae et des Notothenioidei. *Indostomus* est placé en compagnie des Symbranchiformes, des Channoidei et des Anabantoidei.

Summary. - Reliability of clades and taxonomical congruence - Application to the phylogeny of acanthomorph teleosts.

The goal of a phylogeny is usually to get an idea of the real relationships between taxa. It is thus not a good idea to be satisfied with the tree obtained by a simple combined analysis of the data. Indeed, even robust clades in such a tree may not be reliable. Confidence about a phylogenetic statement can only stem from a comparison between results obtained from independent data.

This thesis begins by proposing a repetition index to measure reliability. This index takes into account the number of occurrences for a clade over a set of trees obtained from independent data, that is, data unlikely to be subject to the same reconstruction biases. The more a clade occurs this way, the more it can be considered reliable. The index also takes into account clades that are not compatible with the clade under focus and that are also repeated. The higher the number of occurrences of a clade's contradictor, the less reliable the clade should be considered.

In the second part of the thesis, the repetition index is calculated from a series of analyses involving about two hundred taxa. The analyses are primarily based on four nuclear markers: Rhodopsin, MLL4, IRBP and RNF213 (the latter being used for the first time). These markers are analysed under probabilistic models, separately and in combinations of 2, 3 or 4. This allows to take advantage of combined analyses while still being able to compare sets of independent results.

The results are then summarized into trees using methods designed to include mostly reliable clades. Several ways of dealing with the differences between the taxonomic samplings of the datasets are used. The synthesis trees allow to refine the structure of the acanthomorph (Actinopterygii: Teleostei) phylogeny.

In the basal part of the tree, containing Lampridiformes, Percopsiformes, Polymixiiformes, Gadiformes, Zeioidei, Beryciformes, Stephanoberyciformes, Ophidiiformes, Batrachoidiformes, Gobioidei and Apogonidae, Zeioidei group with Gadiformes; Gobioidei group with Apogoniade, and Beryciformes are not monophyletic. The rest of the tree is divided into a few main reliable clades that contradict the monophyly of Labroidei, Scombroidei, Trachinoidei, Scorpaeniformes and Gasterosteiformes. Cichlidae and Pomacentridae (two labroid families) are related to Plesiopidae, Mugilidae, Gobiesocoidei, Blennioidei and Atherinomorpha. Most taxa in this clade have adhesive eggs. Labridae and Scaridae (other labroids) are placed in a large clade containing, among others, Notothenioidei, most Trachinoidei, Serranidae, most Scorpaeniformes, Zoarcoidei, Gasterosteoidei, Moronidae, Centrarchidae, Elassomatidae, Lutjanidae, Sciaenidae, Acanthuroidei, Tetraodontiformes, Lophiiformes and Caproidei. Within this large clade, Caproidei are related to Tetraodontiformes and Lophiiformes; Epigonidae group with Howellidae and Lateolabracidae; Gasterosteoidei group with Zoarcoidei, Cottoidei and Platycephaloidei.

Syngnathoidei (Gasterosteiformes) group with Dactylopteroidei (Scorpaeniformes), Callionymoidei and Mullidae. This group is sister-group to a clade containing Stromateoidei, Bramidae, Chiasmodontidae (a trachinoid family), and two Scombroidei: Scombridae and Trichiuridae. Two other scombroid families, Sphyraenidae and Xiphiidae, are placed within the stem-group of Pleuronectiformes, together with Carangoidei, Latidae, Centropomidae, Polynemidae, Menidae and Toxotidae.

Indostomus (Gasterosteiformes) is related to Mastacembeloidei, Symbranchoidei, Channoidei and Anabantoidei. This clade contains many fresh-water fishes capable of air breathing.

Key words. - Acanthomorpha - Clades - Phylogeny - Reliability - Supertree - Taxonomical congruence.

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